Appendix H. NOAA Panel Guidelines Including Cross Tabulations

Under the Oil Pollution Act of 1990 (101 H.R.1465, P.L. 101-380), NOAA was charged with writing the rules for natural resource damage assessment relating to oil spills. To comply with this Act, NOAA evaluated whether CV is a reliable method for measuring the economic value of public goods. To do so, NOAA created a Blue Ribbon Panel on Contingent Valuation (co-chaired by two Nobel laureates in economics, Kenneth Arrow and Robert Solow, and including other authorities on economics and survey methodology), which held hearings and issued a written report (NOAA, 1993). That report included "a fairly complete set of guidelines compliance with which would define an ideal CV survey" (p. 29).[1] The report said:

> A CV survey does not have to meet each of these guidelines fully in order to qualify as a source of reliable information to a damage assessment process. Many departures from the guidelines or even a single serious deviation would, however, suggest unreliability *prima facie* (p. 29).

The NOAA Panel outlined 25 guidelines, which are listed in Table H.1. Twenty-two of these guidelines were applicable to this study, and we met 21 of them. Here, we discuss how our study met the applicable guidelines and explain why the Team decided not to meet one of them.

Table H.1. Summary of comparisons of procedures in this study and guidelines of NOAA Panel

	NOAA Panel guidelines	Supported in current study
1	Sample type and size	Yes
2	Minimize nonresponse	Yes
3	Personal interview	Yes
4	Pretesting for interviewer effects	Yes
5	Reporting	Yes
6	Careful pretesting	Yes
7	Conservative design	Yes
8	Elicitation format [WTP rather than WTA]	Yes

1. Page citations to the NOAA Panel's report refer to the version available via the Internet (http://www.darrp.noaa.gov/library/pdf/cvblue.pdf; accessed September 22, 2008).

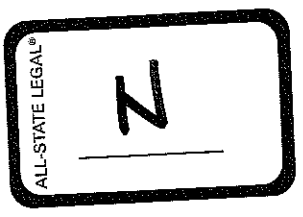

Table H.1. Summary of comparisons of procedures in this study and guidelines of NOAA Panel (cont.)

	NOAA Panel guidelines	Supported in current study
9	Referendum format	Yes
10	Accurate description of program or policy	Yes
11	Pretest photographs	Yes
12	Reminder of undamaged substitutes	Yes
13	Adequate time lapse from accident	NA
14	Temporal averaging	NA
15	No answer option	No
16	Yes/no followups	Yes
17	Cross tabulations	Yes
18	Checks on understanding and acceptance	Yes
19	Alternative expenditure possibilities	Yes
20	Deflection of transaction value	Yes
21	Steady state or interim losses	Yes
22	Present value calculations of interim losses	Yes
23	Advanced approval	NA
24	Burden of proof	Yes
25	Scope test	Yes

H.1 Sample Type and Size

The more detailed guideline from the NOAA Panel stated (p. 30),

> Probability sampling is essential for a survey used for damage assessment. The choice of sample specific design and size is a difficult, technical question that requires the guidance of a professional sampling statistician.

Circular A-4 simply states[2] that

> the subjects being interviewed should be selected/sampled in a statistically appropriate manner. The sample frame should adequately cover the target population. The sample should be drawn using probability methods in order to generalize the results to the target population;

Professor Roger Tourangeau was the sampling statistician and was supported by sampling experts at Westat. We fully met these guidelines.

2. Circular A-4's guidelines all appear on p. 24, so we did not bother to repeat the page reference as we proceeded through this section.

H.2 Minimize Nonresponse

The NOAA Panel (p. 30) stated simple, "High nonresponse rates would make the survey results unreliable."

Circular A-4 gave more details:

> response rates should be as high as reasonably possible. Best survey practices should be followed to achieve high response rates. Low response rates increase the potential for bias and raise concerns about the generalizability of the results. If response rates are not adequate, you should conduct an analysis of non-response bias or further study. Caution should be used in assessing the representativeness of the sample based solely on demographic profiles. Statistical adjustments to reduce non-response bias should be undertaken whenever feasible and appropriate;

This guideline was met. See the body of the report, Section 5.2.4 and Appendix F.

H.3 Personal Interview

The NOAA Panel (p. 30) simply recommends that the survey be done by personal interview. As explained in Chapters 3 and 4, personal interviews conducted by a top national survey firm were used in our study to meet this guideline.

H.4 Interviewer Effect

The NOAA Panel calls for pretests to assess whether the presence of an interviewer makes a difference on the answers (NOAA, 1993). Specifically, the Panel noted (page 31):

> It is possible that interviewers contribute to "social desirability" bias, since preserving the environment is widely viewed as something positive. In order to test this possibility, major CV studies should incorporate experiments that assess interviewer effects.

The Panel's concern was that voting in favor of the program is a socially desirable response and that respondents would be more likely to vote "yes" when an interviewer administered the questions than when respondents completed the questions themselves. We evaluated this issue during the hotel pretests. The hotels pretests (described earlier in Section 3.5) used a form of self-administration; the respondents in the hotel pretests recorded their answers on an anonymous answer sheet rather than reporting them aloud to an interviewer. The team found little evidence that the proportion of respondents voting in favor of the program was systematically lower in the hotel pretests than in other settings, such as the pilot tests, where interviewers administered the questions and recorded the respondents' answers.

These findings were in line with the results of a prior experiment done by Krosnick and his colleagues in 2002 (after the NOAA Panel issued its guidelines), who found no differences in WTP between respondents who indicated their vote by completing a ballot form and placing it in a ballot box and those who reported their answers to an interviewer (Krosnick et al., 2002). In addition, a recent review of the literature on socially desirable responding in surveys (Tourangeau and Yan, 2007) presented evidence that, although interviewer administration of the questions can increase socially desirable responding, such effects tend to occur with highly undesirable behaviors (like illicit drug use) rather than with attitudinal items (like the WTP question applied here).

H.5 Reporting

The NOAA Panel (p. 31) stated,

> Every report of a CV study should make clear the definition of the population sampled, the sampling frame used, the sample size, the overall sample non-response rate and its components (e.g., refusals), and item non-response on all important questions. The report should also reproduce the exact wording and sequence of the questionnaire and of other communications to respondents (e.g., advance letters).

We wrote this report to meet this guideline.

H.6 Careful Pretesting

The NOAA Panel guideline (pp. 31-32) stated,

> Respondents in a CV survey are ordinarily presented with a good deal of new and often technical information, well beyond what is typical in most surveys. This requires very careful pilot work and pretesting, plus evidence from the final survey that respondents understood and accepted the main description and questioning reasonably well.

Chapter 3 summarizes the focus groups, cognitive interviews, small sample pretests, and formal pilot studies that were done as we designed and refined the main survey instrument and the scope instrument (discussed below). Collectively, the members of the study team and V. Kerry Smith (one of the peer reviewers) have conducted many contingent valuation surveys themselves and have reviewed a great many more, and in our experience no other study has undergone such extensive pretesting.

H.7 Conservative Design

The NOAA Panel (p. 32) stated[3]:

> Generally, when aspects of the survey design and the analysis of the responses are ambiguous, the option that tends to underestimate willingness to pay is preferred. A conservative design increases the reliability of the estimate by eliminating extreme responses that can enlarge estimated values wildly and implausibly.

Many steps were taken to implement this guideline:

- The scenario did not describe effects on human and animal health in detail. If the scenario had described such effects of blue-green algae in the Illinois River watershed and of bacteria in runoff and leachate from pastures where poultry waste has been spread,[4] WTP may have been higher than we observed.

- The scenario did not describe taste and odor problems in drinking water that may be caused by large amounts of algae in water (see Cooke and Welch, 2008a, 2008b). If the scenario had mentioned this, WTP might have been higher than we observed.

- The scenario's stated times required for the river and lake to recover naturally after a ban on spreading new poultry waste is implemented (50 years and 60 years, respectively) were shorter than predicted by the natural scientists (see Engel, 2008a, 2008b, 2008c; Wells et al., 2008a, 2008b). If the scenario has described longer natural recovery times, WTP might have been higher than we observed.

- The photographs that were used were chosen to display relatively mild illustrations of water transformation, rather than more extreme versions. Presenting visual illustrations of more extreme instances of algae would have tended to yield higher WTP than we observed.

- The method used to calculate total WTP entailed making statistical assumptions that lowered the final damage estimate as compared to other reasonable assumptions that could have been made instead.

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3. In this quotation and throughout their report, the NOAA Panel used the term "reliability" to describe the possible accuracy of contingent valuation. As noted earlier, the report uses the term "validity" to describe to the same concept.

4. Cooke and Welch (2008a, 2008b) summarized the evidence for Tenkiller Lake.

- Respondents were asked to vote on a one-time tax to pay for alum treatments instead of a proposal that would spread a series of smaller payments out over time. Economic theory suggests that the latter presentation may have yielded higher WTP estimates than we observed.

- Just before asking respondents to vote, the interviewer mentioned a series of reasons that could justify voting against the program and therefore made it clear to respondents that voting against would not be viewed as unreasonable.

- After respondents voted and answered a series of other questions, interviewers offered people who had voted for the program an opportunity to change their decisions and instead vote against the program.

- Before respondents voted, text in the questionnaires told them that the state of Oklahoma spends money on many other types of activities and resources and mentioned some of them explicitly (e.g., prisons, repairing roads, health care for children), thus highlighting other ways respondents might prefer for their tax dollars to be spent.

- The scenario described many other rivers and lakes in Oklahoma, some of which are experiencing excess algae and others of which are not. Thus, the questionnaires identified other water bodies that could be viewed as substitutes for the Illinois River and Tenkiller Lake. The questionnaire also identified other water bodies where tax dollars could be spent on cleanup instead.

- The scenario mentioned undesirable effects of the alum treatment program.

- As discussed in Chapter 2, one could argue that the correct measure of damages in this case would be the amount of money Oklahomans would be willing to accept as compensation for the injury. Because WTP typically yields lower numbers than WTA measurements, this approach was conservative.

- Alum treatments were not viewed as completely effective at solving the problem by all respondents. This, too, yielded a conservative bias in measured WTP.

H.8 Elicitation Format

The measurement of WTP was consistent with the NOAA Panel's advice. The Panel recognized that WTA is the appropriate measure, but recommended that: "The willingness to pay format should be used instead of the compensation required because the former is the conservative choice" (p. 32).

H.9 Referendum Format

Use of the referendum format to measure WTP was consistent with he NOAA Panel's advice: "The valuation question should be posed as a vote on a referendum" (p. 32).

H.10 Accurate Description of Program or Policy

The NOAA Panel stated (pp. 32-33), "Adequate information must be provided to respondents about the environmental program that is offered. It must be defined in a way that is relevant to damage assessment."

Throughout the design and pretesting of the survey (see Chapters 3 and 4), we developed information that was clearly and objectively presented and complete enough to allow respondents to make informed choices.

H.11 Pretest Photographs

The NOAA Panel stated simply (p. 33), "The effects of photographs on subjects must be carefully explored." Substantial time was spent during focus groups in exploring what the photographs communicated to participants.

H.12 Reminder of Undamaged Substitutes

The NOAA Panel stated (p. 33):

> Respondents must be reminded of substitute commodities, such as other comparable natural resources or the future state of the same natural resource. This reminder should be introduced forcefully and directly prior to the main valuation question to assure that respondents have the alternatives clearly in mind.[5]

From the beginning of the interview, respondents were told about substitutes and complements. The first map (Card B, Appendix A.1) and associated text told respondents that Oklahoma has many rivers and lakes. The second map (Card D) and associated text illustrated that Oklahoma has other officially designated Scenic Rivers and described where they are located. Card I showed various lakes and rivers in the state. As respondents looked at this map, the interviewer read:

> Many of the other rivers and lakes in Oklahoma do not have excess algae. These are shown in blue on this map…. These include the other Scenic Rivers: Little Lee Creek, Lee Creek, and Upper Mountain Fork River ….
>
> Some rivers and lakes do have excess algae. These are shown in yellow on this map … The excess algae has caused changes in those places like the changes that have happened in the Illinois River and Tenkiller Lake. In nearby states, there are also some water bodies that have excess algae, and some water bodies that are clear.

Just before respondents were asked to vote, the interviewer read material and showed a summary card (Card N, Appendix A.1) that summarized some of the reasons why they might vote against the proposed alum treatments. The very first item on the list was: "Many rivers and lakes in Oklahoma do not have excess algae."

5. It is worth noting in passing that at least two studies (Loomis et al., 1994; Neill, 1995) found no evidence that reminders of budget constraints and/or substitutes had any effect on respondents.

H.13 Adequate Time Lapse from Accident

This item from the NOAA Panel report (p. 33) is included here for completeness but does not apply to our study. The NOAA Panel was very much concerned with major accidents, especially oil spills (e.g., the *Exxon Valdez* oil spill), that receive large amounts of press coverage. The fear was that in the immediate aftermath of traumatic events shown on the news (e.g., birds and sea otters sick and dying after being covered by oil) might elicit values of WTP that would be unduly affected by transitory emotions and hence unstable over time. NOAA panelists hoped that allowing an adequate lapse of time would allow respondents to view the effects is a better perspective.

H.14 Temporal Averaging

This guideline (p. 33) is a follow up on the preceding guideline. The idea was to conduct the survey in waves over time and average the results. Again, this concern does not apply in our case.

H.15 No Answer Option

The NOAA Panel (p. 34) stated the following:

> A "no-answer" option should be explicitly allowed in addition to the "yes" and "no" vote options on the main valuation (referendum) question. Respondents who choose the "no-answer" option should be asked nondirectively to explain their choice. Answers should be carefully coded to show the types of responses, for example: (i) rough indifference between a yes and a no vote; (ii) inability to make a decision without more time or more information; (iii) preference for some other mechanism for making this decision; and (iv) bored by this survey and anxious to end it as quickly as possible.

As is clear from the quotation, the NOAA Panel's recommendation was based on the assumption that "no-answer" responses would occur because people were indifferent, were unable to make a decision, had a preference for some other mechanism, or were bored by the survey and wanted it to end.

Since the NOAA panelPanel issued its recommendation on this point, scholars have produced a substantial body of research that indicates that the NOAA Panel's assumptions about "no-answer" responses were only partly correct. In fact, a different approach to addressing the Panel's concerns is preferable for application in CV surveys.

This body of research indicates that, if a CV survey is designed very carefully to use language that is clearly understandable to respondents, and if the answer choices offered by questions are clearly understandable to respondents, then selecting an explicitly offered "no-answer" response option will very often be chosen by people who could instead offer a reliable and valid answer by selecting "vote for" or "vote against" if encouraged to do so (see the literature review by Carson et al., 1998; Krosnick et al., 2002). Therefore, offering a "no-answer" option would forego collecting valid votes. Because substantial effort was devoted to ensuring that the questionnaire was understandable to respondents and that respondents understood the choice, the questionnaire was designed to collect as many votes as possible by not offering a "no-answer" option. Respondents who volunteered that they did not know how they wanted to vote were encouraged to offer a substantive answer, and if they declined to do so again, interviewers recorded this declination.

To gauge the possibility that some respondents might have felt indifferent or unable to make a decision, the vote question was followed by a question asking respondents how certain they were of their vote choice. This is a more effective way of identifying uncertainty than is offering a "no-vote" option.

H.16 Open-Ended Followup Questions

The NOAA Panel said (p. 34):

> Yes and no responses should be followed up by the open-ended question: "Why did you vote yes/no?" Answers should be carefully coded to show the types of responses, for example: (i) It is (or isn't) worth it; (ii) Don't know; or (iii) The oil companies should pay.

Immediately after respondents voted, they were asked open-ended questions about why they voted "against" or "for" the program or why they did not know how they wanted to vote. Answers to these questions were recorded and analyzed.

H.17 Cross Tabulations[6]

The NOAA Panel recommended (pp. 34-35):

> The survey should include a variety of other questions that help to interpret the responses to the primary valuation question. The final report should include summaries of WTP broken down by these categories. Among the items that would be helpful in interpreting the responses are:
>
> Income
>
> Prior Knowledge of the Site
>
> Prior Interest in the Site (Visitation Rates)
>
> Attitudes Toward the Environment
>
> Attitudes Toward Big Business
>
> Distance to the Site
>
> Understanding of the Task
>
> Belief in the Scenarios
>
> Ability/Willingness to Perform the Task

6. All percentages in Tables H.2 through H.22 are percentages based on the individual response category row.

Income

Table H.2. Cross-tabulation of vote and income.		
Response category	**Percent voting against**	**Percent voting for**
<5000	55.6%	44.4%
5000-9999	45.2%	54.8%
10000-14999	49.4%	50.6%
15000-19999	36.7%	63.3%
20000-24999	44.1%	55.9%
25000-29999	57.7%	42.4%
30000-39999	30.1%	69.9%
40000-49999	40.0%	60.0%
50000-59999	40.6%	59.4%
60000-74999	44.3%	55.8%
75000-99999	34.5%	65.5%
100000-149999	38.1%	62.0%
>= 150000	38.1%	61.9%
F-statistic (9.46, 642.97) = 2.01, p = 0.033		

Prior Knowledge of the Site

Table H.3. Cross-tabulation of vote and whether respondent had heard anything about the described changes in the river or lake (Q17).		
Response category	**Percent voting against**	**Percent voting for**
No	43.3%	56.7%
Yes	37.9%	62.1%
F-statistic (1, 68) = 2.58, p = 0.113		

Table H.4. Cross-tabulation of vote and whether respondent had personally seen changes described (Q18).		
Response category	**Percent voting against**	**Percent voting for**
No	44.0%	56.0%
Yes	30.0%	70.0%

Prior Interest in the Site (Visitation Rates)

Table H.5. Cross-tabulation of vote and whether respondent had visited the Illinois River (Q14).		
Response category	**Percent voting against**	**Percent voting for**
No	46.1%	53.9%
Yes	37.5%	62.5%
Don't know/Refused	100.0%	0.0%
F-statistic (1.78, 121.24) = 5.56, p = 0.007		

Table H.6. Cross-tabulation of vote and whether respondent had visited Tenkiller Lake (Q15).		
Response category	**Percent voting against**	**Percent voting for**
No	45.8%	54.2%
Yes	37.4%	62.6%
Don't know/Refused	100.0%	0.0%
F-statistic (1.54, 104.5) = 4.60, p = 0.020		

Attitudes Toward the Environment

Table H.7. Cross-tabulation of vote and whether respondent had taken a trip to observe birds or wildlife in the past year (Q39).		
Response category	**Percent voting against**	**Percent voting for**
No	42.0%	58.0%
Yes	40.8%	59.2%
Don't know/Refused	58.2%	41.8%
F-statistic (1.94, 131.84) = 0.20, p = 0.815		

Table H.8. Cross-tabulation of vote and how important to you is reducing water pollution in Oklahoma lakes and rivers (Q2).		
Response category	**Percent voting against**	**Percent voting for**
Not important at all	66.2%	33.8%
Slightly important	67.4%	32.6%
Moderately important	46.3%	53.7%
Very important	43.0%	57.1%
Extremely important	34.7%	65.3%
Don't know/refused	21.2%	78.8%
F-statistic (4.39, 298.61) = 6.43, p<0.001		

Table H.9. Cross-tabulation of vote and should the state spend more money, less money or about what is being spent now on cleaning up pollution (Q11).

Response category	Percent voting against	Percent voting for
A lot less	71.6%	28.4%
A little less	37.5%	62.5%
About what is being spent now	51.6%	48.4%
A little more	40.3%	59.7%
A lot more	33.1%	66.9%
Don't know/refused	60.9%	39.1%
F-statistic (4.33, 294.56) = 4.84, p<0.001		

Table H.10. Cross-tabulation of vote and should the state spend more money, less money or about what is being spent now on state parks (Q12).

Response category	Percent voting against	Percent voting for
A lot less	65.1%	34.9%
A little less	54.3%	45.7%
About what is being spent now	42.2%	57.8%
A little more	37.9%	62.1%
A lot more	30.5%	69.6%
Don't know/refused	55.1%	44.9%
F-statistic (4.34, 295.22) = 5.54, p<0.001		

Table H.11. Cross-tabulation of vote and would you say you think of yourself as a very strong environmentalist, a strong environmentalist, a moderate environmentalist, slightly an environmentalist, or not an environmentalist at all (Q41).

Response category	Percent voting against	Percent voting for
Not an environmentalist at all	52.1%	47.9%
Slightly an environmentalist	50.9%	49.1%
A moderate environmentalist	41.0%	59.1%
A strong environmentalist	26.8%	73.2%
A very strong environmentalist	37.4%	62.6%
Don't know/refused	32.1%	68.0%
F-statistic (4.61, 313.78) = 4.41, p<0.001		

Attitudes Toward Big Business

Table H.12. Cross-tabulation of vote and how much do you believe what the people who run Oklahoma state government say (Q36).		
Response category	**Percent voting against**	**Percent voting for**
Not at all	64.5%	35.5%
A little	48.0%	52.0%
A moderate amount	36.9%	63.1%
A lot	23.0%	77.1%
A great deal	40.1%	59.9%
Don't know/refused	27.7%	72.3%
F-statistic (4.08, 277.19) = 10.05, p<0.001		

Table H.13. Cross-tabulation of vote and how much do you believe what university scientists say (Q35).		
Response category	**Percent voting against**	**Percent voting for**
Not at all	77.7%	22.3%
A little	61.8%	38.3%
A moderate amount	52.8%	47.2%
A lot	32.5%	67.5%
A great deal	21.5%	78.5%
Don't know/refused	53.2%	46.8%
F-statistic (4.42, 300.57) = 17.63, p<0.001		

Distance to the Site

Table H.14. Cross-tabulation of vote and whether respondent lives closer or further than the median distance (118 miles).		
Response category	**Percent voting against**	**Percent voting for**
Closer than 118 miles	39.6%	60.4%
Further than 118 miles	43.6%	56.4%
F-statistic (1, 68) = 1.3, p = 0.26		

Understanding of the Task

Table H.15. Cross-tabulation of vote and how well did the respondent understand the material (D4).		
Response category	**Percent voting against**	**Percent voting for**
Not at all	39.4%	60.7%
Slightly	41.8%	58.2%
Moderately	51.2%	48.8%
Very	51.3%	48.7%
Extremely	0.0%	100.0%
F-statistic (3.82, 259.43) = 1.34, p = 0.258		

Table H.16. Cross-tabulation of vote and did the respondent say anything suggesting that he or she had any difficulty understanding what you told him or her (D5).		
Response category	**Percent voting against**	**Percent voting for**
No	41.8%	58.2%
Yes	32.7%	67.3%
F-statistic (1, 68) = 0.76, p = 0.388		

Table H.17. Cross-tabulation of vote and did the respondent have any difficulty understanding the vote questions (D6).		
Response category	**Percent voting against**	**Percent voting for**
No	41.9%	58.1%
Yes	28.2%	71.8%
F-statistic (1, 68) = 1.63, p = 0.206		

Belief in the Scenarios

Table H.18. Cross-tabulation of vote and did you think that it would take less time than stated for the river or lake to get back to around 1960 conditions without alum treatments (Q29 and Q30).		
Response category	**Percent voting against**	**Percent voting for**
More or equal time	32.8%	67.2%
Less time	56.6%	43.4%
F-statistic (1, 68) = 41.42, p<0.001		

Table H.19. Cross-tabulation of vote and the respondent thought alum treatments would work extremely or very well at reducing algae in the water (Q31 = 4 or 5).		
Response category	**Percent voting against**	**Percent voting for**
Not very or extremely well	63.9%	36.1%
Very or extremely well	27.3%	72.7%
F-statistic (1, 68) = 119.53, p<0.001		

Table H.20. Cross-tabulation of vote and the respondent thought alum treatments would work not well at all or slightly well at reducing algae in the water (Q31 = 1 or 2).		
Response category	**Percent voting against**	**Percent voting for**
Not slightly well or not well at all	37.7%	62.3%
Slightly well or not well at all	76.2%	23.8%
F-statistic (1, 68) = 49.61, p<0.001		

Table H.21. Cross-tabulation of vote and When you decided how to vote, did you think that if the alum treatments are done, your household would have to pay the amount I told you, more than that amount, or less than that amount (Q32).		
Response category	**Percent voting against**	**Percent voting for**
Less than the amount	43.6%	56.4%
The amount you told me	33.5%	66.5%
More than the amount	51.9%	48.1%
Don't know/refused	79.4%	20.6%
F-statistic (2.73, 185.53) = 11.47, p<0.001		

Ability/Willingness to Perform the Task

Table H.22. Cross-tabulation of vote and how impatient was the respondent (D7).		
Response category	**Percent voting against**	**Percent voting for**
Not impatient at all	18.6%	81.4%
Slightly impatient	41.0%	59.0%
Moderately impatient	47.5%	52.5%
Very impatient	48.1%	51.9%
Extremely impatient	41.0%	59.1%
F-statistic (3.7, 251.9) = 1.29, p = 0.277		

H.18 Checking Understanding and Acceptance

The NOAA Panel stated (p. 35): "The above guidelines must be satisfied without making the instrument so complex that it poses tasks that are beyond the ability or interest level of many participants." One would infer from the heading "Checks on Understanding and Acceptance" that they also had in mind questions to probe how well the respondents understood the information presented to them and whether they accepted the scenario and other aspects of the survey.

A great deal of effort went into making the questionnaire understandable and acceptable, and several questions were included to gauge understanding. The questionnaire development process constantly involved assessing respondent understanding using focus groups, one-on-one interviews conducted by the Team, hotel pretests, and pilot surveys (see Chapter 3), which led to revisions of the questionnaire language to improve clarity and interest. The development process also consistently asked respondents whether they would like additional specific information in order to understand the materials being presented and make their voting decision. During the main study interviews, respondents were occasionally asked whether they would like any of the information repeated, to gauge their comprehension. Requests for repetition were exceedingly rare. After respondents voted, a series of questions were asked to discover what respondents were thinking when they voted. Answers to these questions consistently showed that a large share of respondents understood and accepted the scenario (see Section 6.4 for the results from these questions).

The NOAA Panel (pp. 27-28) concluded that a high standard of richness context "about the incident itself and about the respondent's circumstances and choices should be included in the CV instrument" in order to have a survey that would yield reliable data and avoid problems of embedding and warm glow. We achieved this high standard.

H.19 Alternative Expenditure Possibilities

The NOAA Panel stated (pp. 35-36):

> "Respondents must be reminded that their willingness to pay for the environmental program in question would reduce their expenditures for private goods or other public goods. This reminder should be more than perfunctory, but less than overwhelming. The goal is to induce respondents to keep in mind other likely expenditures, including those on other environmental goods, when evaluating the main scenario."

Just before respondents voted, they read a card (Card N, Appendix A.1) summarizing some of the reasons why they might vote against the proposed alum treatments. Included were the following two reasons, which the interviewer also read aloud to the respondent:

> *If the state does increase your taxes, you might prefer that it spend the money on other environmental issues or on issues other than the environment.*
>
> *Or the tax increase might be more than your household can afford to pay.*

H.20 Deflection of Transaction Value

The NOAA Panel offered the following guideline (p. 36):

> The survey should be designed to deflect the general "warm-glow" of giving or the dislike of "big business" away from the specific environmental program that is being evaluated. It is possible that the referendum format limits the "warm glow" effect, but until this is clear the survey design should explicitly address this problem.

The best way to avoid warm glow effects is to be very explicit about the details of what is to be valued so that respondents are attending to those details rather than falling back of responses that reflect support for the environment in general. Our debriefing questions confirmed that we were successful in doing this.

To address resentment toward big business, we included paragraph in Section 6 of the survey (Appendix A), not long before the voting question was asked:

> If a court bans spreading of poultry litter, the industry will have to safely get rid of all the litter they produce from now on. The industry will have to pay for this, and the river and lake will naturally return to what they were like in around 1960. If the people of Oklahoma want this to happen 40 years sooner, there will be an additional cost for the alum treatments. Oklahoma taxpayers will have to pay some of this cost because many chicken and turkey farms have gone out of business over the years. In addition, many other Oklahomans contributed to the excess phosphorus through sewage and their use of fertilizer.

We concluded from focus groups and cognitive interviews that this deflected much of the resentment. To the extent that we were not able to fully deflect such feelings, this would tend to lower the final value estimates and hence make them more conservative.

H.21 Steady State or Interim Losses

The NOAA Panel stated (p. 36), "It should be made apparent that respondents can distinguish interim from steady-state losses." Our respondents were very clear that we were asking them about interim losses.

H.22 Present Value Calculations of Interim Losses

The NOAA Panel suggested (p. 36), "It should be demonstrated that, in revealing values, respondents are adequately sensitive to the timing of the restoration process."

Survey respondents were sensitive to the timing of the natural recovery process (see Section 6.3.2). The scope test (Section 6.6) also shows that respondents were sensitive to the timing of restorations as a result of the alum treatments.

H.23 Advanced Approval

The NOAA Panel stated (pp. 36-37),

> Since the design of the CV survey can have a substantial effect on the responses, it is desirable that — if possible — critical features be preapproved by both sides in a legal action, with arbitration and/or experiments used when disagreements cannot be resolved by the parties themselves.

This was infeasible in our case. For one thing, it would have been difficult for both sides in the case to agree on the nature and extent of interim injuries. This is perhaps one of the Panel's more idealistic suggestions.

H.24 Burden of Proof

The NOAA Panel stated (p. 37),

> Until such time as there is a set of reliable[7] reference surveys, the burden of proof of reliability must rest on the survey designers. They must show through pretesting or other experiments that their survey does not suffer from the problems that these guidelines are intended to avoid. Specifically, if a CV survey suffered from any of the following maladies, we would judge its findings "unreliable:"
>
> — A high nonresponse rate to the entire survey instrument or to the valuation question.
>
> — Inadequate responsiveness to the scope of the environmental insult.
>
> — Lack of understanding of the task by the respondents.
>
> — Lack of belief in the full restoration scenario.
>
> — "Yes" or "no" votes on the hypothetical referendum that are not followed up or explained by making reference to the cost and/or the value of the program.

We accept that it is incumbent on researchers to show that they have conducted a valid study and we have endeavored throughout this chapter to demonstrate the validity of our work. Most of the criteria stated in the bullet items have already been addressed (responsiveness to scope is discussed in Section 6.6. We believe we have met this guideline.

7. As stated previously, in this report, we considered the degree to which the procedures we followed produced accurate results. In slightly more technical terms, we sought to assess the *validity* of our results. Even among social scientists, there is confusion about the meaning of the terms "reliability" and "validity." They are sometimes used as synonyms, but they have distinct meanings in most social sciences. "Reliability" refers to the consistency of the results produced by a measure applied to the same person. "Validity" refers to the degree to which a measurement tool accurately quantifies the underlying constructs. For example, the validity of an IQ test is whether or not it accurately measures a person's true intelligence. The reliability of the test would be whether the same test given to the same person multiple times gives the same result. We adhere to those definitions here.

H.25 Scope Test

The NOAA Panel stated if a CV survey suffered from [inadequate responsiveness to the scope of the environmental insult], we would judge its findings 'unreliable' (NOAA, 1993, pp. 36, 62).

The Panel was referring to the expectation, based on economic theory, that WTP to achieve a larger environmental improvement should be larger than WTP to avoid a smaller one.

A scope test was an integral part of this study, and the data confirmed responsiveness to a scope manipulation.

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